Abstract

[0023] A method of forming an inter-metal dielectric layer structure is provided. The method includes the following steps. A process gas is introduced to form a low-k dielectric layer over the substrate. A reactant gas is in situ introduced to etch the low-k dielectric layer back and to react with the process gas to form a dielectric layer containing an extra element on the low-k dielectric layer. The extra element is provided by the reactant gas. A volume ratio of the reactant gas to the process gas is larger than about 2. The reactant gas may be a nitrogen fluoride (NF_3) gas for providing extra nitrogen (N) or a carbon fluoride (C_xF_y) gas for providing extra carbon (C).